

Related Actions	Performance Measures	Lead Entities	Funding Status	Legislation Required (X for Yes)
11.1 Advance new water technology to improve Data Management and Modeling by implementing the following:	A. Status of development and implementation strategy.	Resources Agency & CalEPA , Health and Human Services, Public Utilities Commission, Energy Commission, Bureau of Reclamation, USEPA and other stakeholders.	All partially funded, except 11.1.2 is unfunded	Yes, for all sub-actions
11.1.1 Development and implementation of a standardized protocol for water use and quality measurement and reporting strategy and implementation plan necessary for sustainable California water planning and management.	B. Status of development and compliance with protocol.			
11.1.2 Development and compliance of protocol for distributed data storage and use policy with all database managers and with all data linked to the appropriate metadata.	C. Status of development of database portal.			
11.1.3 Development of effective interactive database portals, such as Water PIE (DWR) and HOBBS (UC Davis), should continue with a high priority.	D. Degree of support for monitoring of model protocols.			
11.1.4 Support for the maintenance of current modeling protocols and standards that provide guidance to water stakeholders and decision-makers, and their technical staff, as models are developed and used to solve California's water and environmental problems. The California Water and Modeling Forum should continue to have a major role in this important effort.				
11.2 Advance new water technology to improve both in situ (on-site) and remote sensing for data acquisition by implementing the following:	A. Availability of translation software.	Resources Agency, CalEPA, DWR, Governor's Office (GoBiz), NOAA, NASA, DOE Labs & University Research	All unfunded, except 11.2.8 & 11.2.9 are partially funded.	Yes, for 11.2.4
11.2.1 Developing closer coordination between in situ sensing and remote sensing.	B. Numbers of technology fairs held.Means of effectively transfer technology that does not orphan important technology is in use.			
11.2.2 Supporting technology fairs and/or other effective venues for presenting licensing opportunities for technology developed by the National Laboratories and other government agencies with technology development focused on the water environment.	C. Number of landbased radar systems deployed.			
11.2.3 Increasing the deployment of land based radar where local topographic features prevent adequate weather forecasting.	D. Status of development of protocol.			
<i>In situ (on-site) Data Acquisition:</i> Priorities for in situ data acquisition technology research include:	E. Status of development of sensors.			
11.2.4 Development is required of protocol for data acquisition and compatibility of associated equipment.	F. Development of remote sensing capability for freshwater chemical and physical parameters.			
11.2.5 Development of cost effective sensors.				
<i>Remote Sensing Data Acquisition:</i> Priorities for remote sensing data acquisition technology research include:				

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<p>11.2.6 Development and use of remote sensors capable of accurately determining qualitatively quantitatively more chemical and physical parameters for fresh water bodies.</p> <p>11.2.7 Development of inexpensive, local remote sensors to replace or complement <i>in situ</i> sensors for the purpose of providing monitoring capability that is less susceptible to vandalism.</p> <p>11.2.8 Continue the development of utilizing airborne drones to provide targeted data to complement satellite data (e.g., snowpack, reservoir level).</p> <p>11.2.9 Increased partnerships between the National Aeronautics and Space Administration (NASA), state and private sectors to enhance existing resources while realizing savings by reducing duplicative monitoring and/or increasing required data acquisition opportunities.</p>	<p>G. Number of inexpensive local remote sensors in use.</p> <p>H. Number of drones routinely used.</p> <p>I. Number of public/private partnerships.</p>			
<p>11.3 Advance new water technology to improve efficiencies for the Water-Energy Nexus by implementing the following:</p> <p>11.3.1 Smart grid technologies for water and energy conservation and management.</p> <p>11.3.2 Use of renewable energy for water treatment and transport processes.</p> <p>11.3.3 Developing anaerobic processes to facilitate energy recovery from supply and wastewater organic residuals.</p> <p>11.3.4 Improve technology for residential use of point-of-use (POU) and point-of-entry (POE) treatment.</p>	<p>A. Percentage of connections with automatic and advanced metering technology installed.</p> <p>B. Percent of energy for water uses from renewable sources in 2020.</p> <p>C. Percent of organic residual treatment processes providing bioenergy in 10 years.</p> <p>D. Level of self monitoring incorporated into POU and POE devices</p>	DWR, PUC, CEC, SWRCB, CDPH	All Unfunded	Yes, for 11.3.1, 11.3.2 & 11.3.3
<p>11.4 Advance new water technology to improve Membrane Water Treatment by implementing the following:</p> <p>11.4.1 Further development of more robust, cost- and energy- efficient, general-purpose membranes for use in seawater desalination, brackish water treatment, and wastewater and water reuse applications, with removal of contaminants not now efficiently removed (e.g., boron, contaminants of emerging concern), and recovery of beneficial salts and minerals for reuse.</p> <p>11.4.2 Further development of energy recovery technologies, particularly for high-pressure reverse osmosis units (e.g., operational pressure as high as 1,180 pounds per square inch gauge [psig], or 8 megapascals [MPa]) but also with application to separation technologies operating at lower pressures.</p>	<p>A. Number of cost effective low energy use membranes developed and in use.</p> <p>B. Number of I high pressure RO applications fitted with energy recovery devices</p> <p>C. Level of advancement of remotely controlled small water treatment units</p> <p>D. Level of advancement of membrane separation technology in remote</p>	DWR, SWRCB, CEC, CDPH	All partially funded, except 11.4.5 is unfunded.	Yes, for 11.4.5

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<p>11.4.3 Further development of smart control technology that ensures more dependable operation of treatment facilities including remotely located treatment facilities (distributed treatment).</p> <p>11.4.4 Development of membrane separation technologies capable of reliable and economic deployment to remotely located communities (distributed treatment).</p> <p>11.4.5 Significantly broadened deployment of brine disposal technologies for disposal into marine environments already used outside of California.</p>	<p>communities.</p> <p>E. Level of deployment of brine disposal technologies.</p>			
<p>11.5 Advance new water technology to improve Biological Water Treatment by implementing the following:</p> <p>11.5.1 Development and deployment of technologies focused on wastewater cleanup for recycling process and wastewater, including use as drinking water (i.e., drinking water, irrigation, process water, groundwater recharge).</p> <p>11.5.2 Development of technologies to reduce chemical use and increase energy efficiency, such as engineered wetlands for wastewater treatment and ecosystem enhancement.</p> <p>11.5.3 Technology development to support the increased use of affordable distributed biological water and wastewater treatment systems for small, rural communities.</p> <p>11.5.4 Development of better control technology for biological treatment, similar to the earlier stated research priority for membrane separation technology.</p>	<p>A. Number of wastewater cleanup technologies developed and deployed.</p> <p>B. Number of new innovative sites using engineered wetlands and meadows for wastewater treatment.</p> <p>C. Number of biological based water and wastewater treatment units deployed in small communities.</p> <p>D. Number of small water treatment units being operated remotely using smart control technology.</p>	<p>SWRCB, CDPH, DWR</p>	<p>All unfunded, except 11.5.4 is partially funded.</p>	
<p>11.6 Advance new water technology to improve watershed management by implementing the following:</p> <p>11.6.1 Software development that leads to more effective combining and utilizing of applicable models, in recognition of the need for the effective management of the multiple factors affecting watersheds, including climate change impacts.</p> <p>11.6.2 Improved data collection for surface-water and groundwater basin descriptive parameters, including water runoff and storage as a function of time throughout the basin by more extensive use of satellite monitoring, where applicable, and partnering with other agencies (i.e., DWR, SWRCB, US Geological Survey, and others) where possible.</p>	<p>A. Status of development of modeling software and major models.</p> <p>B. Status of improved surface and groundwater data collection.</p> <p>C. Number of groundwater recharge sites developed and implemented.</p>	<p>DWR, SWRCB, Resources Agency, CalEPA & Applicable Federal Agencies</p>	<p>All unfunded, except 11.6.2 is partially funded.</p>	<p>Yes, for 11.6.3</p>

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11.6.3 Expanded use of flood plains and other sites having good recharge potential for groundwater recharge.				
11.7 Advance new water technology to improve Agricultural Water Use Efficiency by implementing the following:	A. The level of adoption of cost effective water measurement and soil moisture sensing technology.	DWR, CDFA	All unfunded	Yes, for 11.7.1 and 11.7.7
11.7.1 Increase the adoption of field level water measurement (flow and total) and soil moisture-sensing technologies to increase water management accuracy and data.	B. The percentage of high efficiency irrigation systems in use.			
11.7.2 Promote the use of high-efficiency water irrigation systems, provide necessary maintenance, and utilize proper irrigation scheduling methods to optimize water- and energy-use efficiency.	C. The level of adoption of advanced technologies for irrigation scheduling			
11.7.3 Increased adoption of one or more technologies for irrigation scheduling (e.g., including remote sensing, weather based, and/or crop/soil-based technologies).	D. The level of development of irrigation performance monitoring platforms.			
11.7.4 Development of cost-effective irrigation system performance information monitoring platforms for evaluating irrigation performance criteria in real time.	E. The percentage of water districts that supply water based on customer demand.			
11.7.5 Increase the number of water districts that provide water deliveries on a demand basis to maximize on-farm water use efficiency.	F. The number of acres or volume of water that provides a local environmental co benefit.			
11.7.6 Use agricultural water and land whenever appropriate to provide local environmental benefits (e.g., flooded rice ground to provide seasonal wetlands for migratory birds and reproduction habitat for fish and aquatic life).	G. The number of transfers or the volume of water transferred between water suppliers or water users.			
11.7.7 Identification of shared use opportunities for water supplies (e.g., water exchanges between agricultural and urban users).	H. Identification and testing of performance monitoring platforms			
11.8 Advance new water technology to improve Urban Water Use Efficiency by implementing the following:	A. Percentage of water connections using advanced metering and submetering technology	DWR, PUC, CEC, SWRCB, CDPH, CDFA	All unfunded, except 11.8.2 is partially funded.	Yes, for 11.8.1 & 11.8.4
11.8.1 Metering infrastructure to promote more efficient water use (e.g., individual apartments, remote access to water use data).	B. Level of implementation of efficient plumbing code and appliance water standards			
11.8.2 Continued advancement of plumbing code and efficiency standards for low-flow appliances and fixtures, such as toilets and clothes and dish washers in the home and low-flow cleaning	C. The percentage of water districts implementing water loss analysis			

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<p>technologies in the commercial and industrial sectors.</p> <p>11.8.3 Increased use of American Water Works Association water-loss software and verification program.</p> <p>11.8.4 Greater use of low-water-use landscaping.</p>	<p>and repair programs.</p> <p>D. Percentage of low water use landscapes.</p>			